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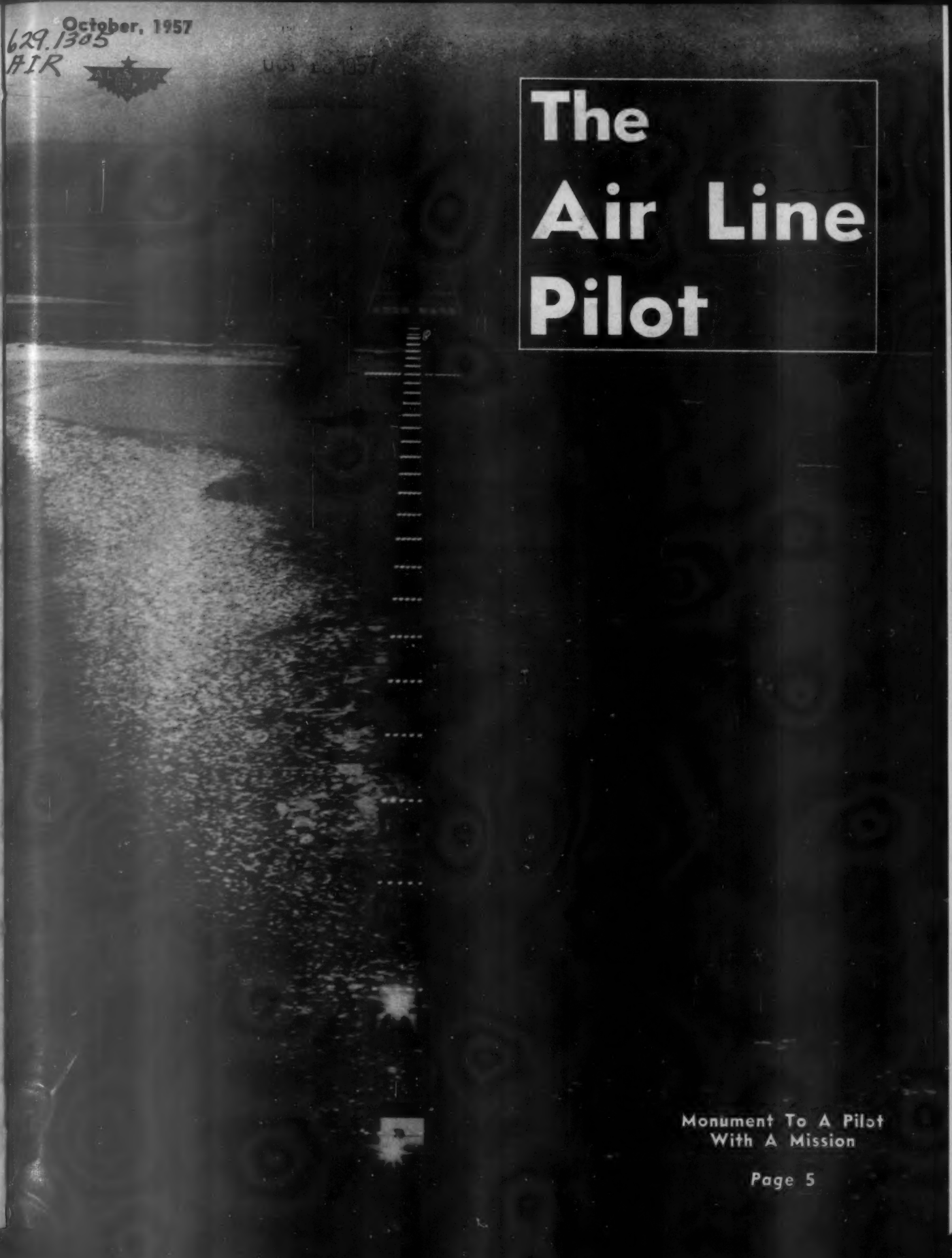
The Air Line Pilot



Monument To A Pilot With A Mission

Page 5

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ON BLAMING THE PILOT

"It's The Rich Wot Gets The Pleasure; It's The Poor Wot Gets The Blame"

By Maj. Oliver Stewart
Great Britain

That classical ballad: "She was poor but she was honest," contains the lines: "It's the rich wot gets the pleasure; it's the poor wot gets the blame." The song writer concludes with the philosophical comment: "Isn't it a bleedin' shame?" In many airplane accidents the pilot gets the blame while most everybody else is exonerated. The words "pilot error" occur repeatedly in the conclusions of investigating committees and the basic assumption is that, if all regulations have been complied with in the building of the airplane and if all the bits of paper have been correctly filled in before the departure, the only person who can be at fault when things go wrong is the pilot.

"Never Turn Back . . ."

In the early days of aviation the commonest accident was associated with a failing engine on take-off. Instructors used to drill into pupils the precept: "Never turn back on a failing engine. Go straight on; it's safer to hit the side of a house than to try to turn back." But pilots did try to turn back and, the aircraft of those days having a slender margin between flying speed and stalling speed, the consequence was normally a stall and spin into the ground. And the instructor would tear his hair as the remains of the pilot were being carried away: "The silly so-and-so," he would rave, "I told him never to turn back on a failing engine." And the verdict was then duly inscribed: An error of judgment on the part of the pilot.

The possibility that there was also an error of judgment on the part of those who had failed to build adequate trustworthiness into the engine was not considered. The possibility that those responsible for the stalling characteristics of the airplane might have a share in the blame was not raised. The pilot, through his inability to overcome the natural instinct to turn back to the airport when the engine failed, was held to be the "cause" of the accident.

Supreme Command

In those days there was some excuse for this attitude. Engine and airplane designers were struggling with imperfectly understood problems. Moreover the pilot was pretty much alone in the operation of a comparatively simple aircraft. He alone was entitled to check the fuel levels, the functioning of the controls and the condition of any part of the airframe and engine. When he took off there was no kind controller in the tower to tell him if

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the way was clear. He had to look around and peer into the sky and make sure that it was clear and that no other machine was approaching to land.

There was, then conceivably this measure of justification for the custom of putting everything down to the pilot. But the custom continues without the justification.

The pilot is no longer the sole person involved in the operation of the flight. Thousands of people through written or spoken mediums are in some way directly or indirectly involved. He is bombarded with documents. He is stuffed with detailed information. He must rely on air traffic controllers for the proper information. He must rely on designers and manufacturers for the trustworthiness of his plane. He must rely on the government for the propriety of regulations. While the safety of all aircraft components have increased, so have their complexity, and they are by no means perfect. An error, a failing any place along the line becomes the pilot's problem although not a mistake of his own doing. Under these circumstances, it is surely time to give up the custom of attributing accidents to pilot error unless there is powerful supporting evidence.

I would like to discuss in general terms two comparatively recent accidents. In both there was a heavy death toll and I shall not refer to individuals by name or to the aircraft by name. Nevertheless, some may recognize the occasions. The reason I have selected these two accidents, is that they fall into clearly established categories: the first being concerned with engine failure at take-off and the second with the weather.

Theory—And Practice

Four-engined aircraft derive additional safety in relation to their ability to fly on three engines. Their three-engine performance is measured and loadings are laid down which will still permit the aircraft to climb after the failure of any one engine. That is the theory. The practice is not always the same. The rate of climb in three engines at full load may be small and it will be affected by temperature, by turbulence, by trim and even by the age of the aircraft. It will, of course, be affected also by whether the propeller of the defective engine is feathered.

Imagine, now, a four-engined aircraft, fully loaded with passengers, taking off in a gusty wind of medium strength—37 kilometers an hour. The wind is across the runway and as the aircraft becomes airborne one engine in an outer position fails. In theory the pilot should have been able—with feathered prop—to climb slowly. But, under the best conditions, the climb rate would have been marginal. In other words small contributory factors —the amount of turbulence in the cross wind and even the form of the gusts —might have wiped out that margin. It emerged that the propeller had not

been feathered; but whether that was because the captain was still hoping to obtain some power from the engine or because there was a failure of the feathering mechanism or because the pilot made an error of judgment, is not known or knowable. The destruction on crash was too great to enable the point to be decided and no one in the airplane lived to give evidence. But the court of inquiry rejected the first two possibilities and chose the third: pilot error.

Not Proven

Very properly the British Air Line Pilots Association protested. But their protests were of no avail. Now the point I make here is that there might have been a pilot error; but that it was not proved. The court went the way of so many courts and, when the evidence was insufficient to point inescapably to a single cause, turned to the pilot. Being dead, the pilot had no effective means of replying to the charge.

Now let me take a case in which the pilot lived. Here the interest lies in the fact that, had he not lived, the chances are that the accident would have been attributed to pilot error. For there was no sign of the failure or malfunctioning of any important component in the aircraft or in its four engines. Everything was in order and examination of the wreckage confirmed that everything had remained in order. It was because the pilot and the co-pilot survived and were able to relate the remarkable series of events which led to the crash, that the court was able to find that the accident was due to unexampled and unpredicted weather conditions.

As the aircraft was being made ready to leave, storms were raging in the area but none of them was near the airport and the closest line squall was given as several hundred kilometers away. The aircraft captain noted the squalls and took the greatest care to obtain the latest weather information. But it was all in agreement that there were no storms close to the airport or liable to interrupt the flight, far less to endanger it. In order to avoid turbulence from the overhang of any of the storms, the pilot discussed with other members of his crew the advisability of slightly adjusting the course to be flown.

Normal Take-Off

At take-off the conditions were satisfactory, although storms with lightning could be seen in the far distance. The aircraft was watched from the tower as it made a normal taking-off run. Rain was then falling but visibility was still reasonably good. As the aircraft disappeared from the view of the watchers in the tower, they saw a red glow in the direction it had taken. They instantly set in train rescue and fire-fighting action. Although heavy ground had to be covered beyond the

end of the runway, rescue teams were in action within 10 minutes.

The story which the surviving members of the crew related later was this: The take-off had been normal and the aircraft had become airborne and had started a normal rate of climb at normal air speed. The point had been

(Continued on Page 21)

Ernie Cutrell:

Man With A Mission

By Sam Saint
AA

(Reprinted From American Aviation)

My phone rang at four a.m. on a chilly spring morning in 1944. A voice on the other end said, "Let's go flying. The weather is *real* good this morning." The voice was the voice of my boss, Ernie Cutrell, then a lieutenant colonel in charge of an all-weather flight project for the Air Transport Command.

"Good weather" in Ernie's vocabulary was any meteorological phenomenon that reduced the ceiling below 200 feet and the visibility below ¼ mile. "Poor weather" days, when ceilings and visibilities were higher, were days for continuing the endless round of knocking on doors to talk about what was learned flying on "good weather" days.

100-Yard Visibility

When Ernie said the weather was "*real* good," I knew I'd have trouble driving to the airport. It took a "follow-me" jeep to help us find the take-off runway at Mitchell Field. Visibility in the early morning darkness was about 100 yards.

One compensation: We had no air traffic delay. We were promptly cleared to fly "anywhere in the New York area at any altitude!" In fact there was not another airplane in the sky for several hundred miles.

Newark was giving zero and a sixteenth of a mile. "Good, we'll go there," said Ernie. "I want you to make a few approaches. This might —this just might change your mind about double-row approach lights." This patient, let's-go-try-it-and-see attitude was typical of this tall, quiet-spoken pilot whose eyes and quick smile always betrayed deep interest in what he was doing.

Old Newark System

Newark, at that time, had what nearly everyone else thought was the best approach light system in the world: a twin row of high-intensity light fixtures extending the edges of the runway out into the approach area. Like everyone else (who flew only in "poor weather") I thought two rows of lights were necessary for lateral reference. They sure looked good when breaking out of a 300-foot ceiling with ¾ of a mile visibility.

Ernie and I had gone round and round on twin-row versus a single centerline configuration for approach lights. I remember a night when we walked the streets of Gainesville, Ga., into the wee hours going back and forth over the same arguments, now and then pausing to discuss the "texture" of a neon sign down the street, or a brighter, "point-source" of light. Ernie was patient with the young man who didn't yet know how little he knew. "One of these days we'll get a spot of 'good weather'," he said, "and we'll go flying. You can't decide this by talking about it."

He was right. That morning at Newark I learned about approach lights by flying in weather that was "good" enough to separate sound practical answers from theoretical analysis. We made full stop landings for nearly two hours. The tower operator in his glass cage close by the runway said, "I'm convinced you are doing it by what I hear!" He never did see us until the weather turned "poor" and we taxied in for breakfast.

12-Year Effort

During the 12 long years that followed, Ernie gathered the support of one here and one there, then groups and finally the backing of the Air Line Pilots Association and the Air Transport Association until finally the single-row, center-line approach lights began to appear at major terminals. Today nearly everyone knows what Cutrell knew all those years ago. A single-row, center-line approach light system is fundamental and right—one of the major safety contributions of the past ten years.

On March 6 of this year, Cutrell received the first annual safety award of the Air Line Pilots Association. He has received other awards. Mostly people think of Cutrell and approach lights. Few realize the much broader scope of this legendary man's contributions to the progress of all-weather flight.

For example: At Newark Airport in 1934, Cutrell made 167 full-stop landings with a tri-motored Ford *while flying under a canvas hood!* This was only one of many milestones since Ernie began flying in 1918. His wealth of experience has been felt in countless meetings where all sorts of instrument flying projects have been gently but firmly nudged in practical directions.

Ernie's wife stood with him as the ALPA award was made. She is perhaps the only one who knows the heartbreaks Ernie suffered and the many roadblocks he climbed without receiving—or expecting—recognition.

When Ernie Said The Weather Was "Real Good", Sam Knew He Would Have Trouble Getting To The Airport

Kuhn's Candid Comments:

Aging Isn't Necessarily Awesome

On The Contrary, Says The Sage Of The Ozarks, It's Subtle—Just Downhill And Shady. The Answer To Pilot Aging And Jets: Simply Health And Ability To Fly

By Dave Kuhn
TWA

It is suspected that the reason I was asked to write something on the aging pilot is because of my years. True, I am just middle age (turned fifty last month) and have had a few ups and downs in that time. However it is a bit awkward to describe an old pilot. There was a Hollywood party girl, who through the years, had accumulated lots of mileage by use of a heavy foot on the throttle of life. The inquiring reporter asked her at what age a gal lost interest in the things that provide stories for our scandal magazines. Her only answer could be, "Ask someone older than I, Sonny." Thus we see, it is just possible that aging is a normal process in a party gal as well as a pilot.

Dr. G. J. Kidera, Medical Director of United Air Lines, writes in a column in the UAL house organ *Aging Isn't Awesome.* He states: "While changes in hair color and skin texture (wrinkles) are an index of aging, they in no way indicate individual performance capacity. The true evidences of aging are far more subtle." Now I don't know how old Dr. Kidera is, or how his wrinkles stack up with mine, but I will certainly agree this aging process is subtle.

Stiff Joints, Etc.

With a pilot it is stiff joints, unsolicited and unappreciated. Cockpits keep getting more difficult to get into. Golf courses are longer. Steps are steeper. Last year's belt notch is too snug. In order to see what's going on, bi-focals prove an unmixed blessing. Whiskey gets weaker. Things that once were vital lose importance. There is a growing need of a roof that doesn't leak and a warm place to read the paper. As my friend "Shot-Gun Britton" says, "It's downhill and shady."

On Physical Capacity, the good Doctor says: "Younger individuals have a greater capacity and output over a short distance; older men do better if the task is spread over a greater time and distance and does not require violent burst of effort. This is borne out by track records, both human and horse. The younger men and horses excel in the sprints; the older entries perfom better over the longer distances. All this would indicate that younger men might be better off taking short vacations since their need to 'simmer down' is greater, while an older person would do better, vacation-wise to take a single, more protracted vacation each year." He obviously left unsaid some things, that have nothing to do with flying. You oldsters will understand.

About The Article

Pilots are being faced with many problems as aviation prepares for the jet age. They are interested in the answers to these. Many ALPA Committees are active in trying to find these answers. We thought many of our readers would be interested in what some of these Committees are finding out, presented in an interesting, readable way, without a lot of confusing technicalities. We asked Dave if he would tackle the job. He said he would. This is the first of what we hope will be a continuing series of articles presented from time to time. Your comments will be welcome.

Memory And Old Age

On memory, Dr. Kidera says: "Disregarding frank senility, memory changes are extremely subtle. As one gets older he develops an ability to remember only those facts which are important to him. (A younger man remembers certain phone numbers better because of their relative importance.) The motivation for memory changes with age. As we grow older, our speed in memorizing is slightly slower but our memory is more accurate as to detail." This might have some appeal or comfort to some of us.

Then his punch line is: "Since aging is a process which begins nine months before we are born, it is important to all of us to accept its changes graciously and gratefully." That sounds good, eh?

All this concern (if there is any), stems from the fact that shortly we will have the jets. The question seems to be: What qualifications will be needed to pilot these beasts? Will it be only the tall, bronzed and clear eyed? Must we discard the fat, wheezy and balding? The answer has been established, lo, these many years—*health and ability to fly.*

A Pilot's Woes

In my 21 odd years as an air line pilot, the same question poses itself with the introduction of each new piece of equipment. When we quit the Northrup mail-plane for the DC-2's, there was much speculation as to who was skillful enough to fly such a complicated monster. Next the DC-3 made the left seat on the DC-2 available to anybody, even co-pilots. When the Boeing 307 Stratoliner came along, pilots with exceptional skills were handpicked, out of seniority, to guide this "heavier, faster and more productive," pressurized giant of the skyway. TWA then went all out and started the Constellation series with the 049. It took a strike to prove that this too, was just another airplane that any pilot could fly. The hand-picking stopped. Meantime, the CAA, for lack of better things to do, also perhaps to justify their existence, devised ground schools and transitions programs, that may well bankrupt the air lines. Months spent in "checking out" is costly since a crew and empty airplane runs about $3.40 per minute, to operate. The next step is a torture chamber called "flight simulator."

(Continued on Page 21)

Challenge Of High Speed Flying

The Challenge Lies In Man's Three Hostile Opponents Of Gravity, Space And Velocity; And Of The Three, Velocity Is The Most Implacable Foe

By Col. H. G. Moseley

Chief, Aero-Medical Safety Division, USAF's Directorate Of Flight Safety Research

Flying has become a challenge: an exquisite challenge to man's ability to design, to engineer, and to build; a provoking challenge to his skill and daring in a realm of new and formidable frontiers. In meeting this challenge, he has been amazingly successful; so successful, in fact, that like a precocious youth he is hurtling past all known concepts and confounding his professors by asking the solution of thermal barriers, cosmic rays, and other riddles which are not yet included in the textbooks.

However, an unexplained complication has arisen that is causing him to pause in his bludgeoning progress. It is a matter of tolerances which cannot be improved and of design which cannot be changed. It is the design of man himself, who must fly these fabulous products of his ingenuity. And the limitation of concern is not his physical frailty, but an unexpected inadequacy in the very method by which he has been able to survive through these many millenniums.

The Human Animal

The human animal has survived by virtue of his ability to perceive, decide, and react. He perceives existing conditions, decides whether they are hostile or friendly, alluring or distasteful, and reacts in the way best calculated to ensure his survival. From prehistoric times to the present, this basic behavioral sequence has not changed, not even when man solved the riddle of lift and energy and undertook the conquest of space. This is the more amazing because man is placing himself in competition with ever more awesome machines and dangerous environments. Were the modern pilot placed side by side with Cro-Magnon man and confronted with a mutually understandable situation such as the sudden appearance of a saber-tooth tiger, both would perceive the situation with the same speed, interpret it as being hostile at approximately the same instant, and react by withdrawal with about the same alacrity. However, in modern high-speed flying, man is pitting himself against opponents that are immeasurably more hostile than a saber-tooth tiger. These are gravity, space, and velocity.

Of the three, velocity is emerging as the most implacable foe. Gravity and space are rather effectively held at bay by aerodynamics and by man's ability to carry his necessary environment in the bubble of his canopy or the enclosure of his cabin. But in the velocity of flight, man finds himself continually pitting his wits against a course of events which transpire with unbelievable rapidity. And here, perhaps for the first time in all his occupations, man finds that he has placed himself in a true enigma, and that his physical limitations are completely inadequate for the demands of the game. As a result, he is frequently in jeopardy, and even slight errors can be attended with results that are enormously traumatic.

The Pilot's Ability

Successful flight is absolutely dependent upon the pilot's ability to 1) perceive his world and cockpit about him, 2) recognize the meaning and significance of what he perceives and decide from such observations the course of action which will best guarantee unhampered continuance of his flight, and 3) react in a manner that will not only make the aircraft respond to his decisions, but maintain it in flight during his preoccupations and distractions. In modern high-speed aircraft, he frequently finds himself performing these tasks while he is traveling at speeds slightly below Mach 1, or approximately 600 miles per hour. At this speed he is traversing space at 880 feet per second.

Here is where it is quite appropriate to contemplate a small measure of time —one-tenth of one second, to be exact. This is the amount of time it takes,

"40,000 feet — Chickenfeed! . . ."

Courtesy: De Havilland Gazette

on the average, for the optic nerve and its ramifications to carry any image the retina of the eye picks up to the brain. In other words, we "see" an object approximately one-tenth of a second after our eye beholds it.

This delay, so insignificant in our normal lives, obtains startling stature in the occupation of flying. While flying at 600 miles per hour, the pilot traverses 88 feet in that instant. Thus he is 88 feet closer to an object in front of him than he thinks he is when he sees it. And this is as unchangeable as the laws of nature, because no known drugs or electronics or forces can reduce this lag. It is an integral part of the human design.

Yet visual perception is one of the fastest processes upon which man depends for his survival. Reaction is much slower. It takes on the average four-tenths of a second before a decision from the brain can be transmitted into useful action. Four-tenths of a second for the nerves to carry the impulses and to stimulate the hands or feet into effective movement. Four-tenths of a second before the pilot, having decided to turn his aircraft, can put such a decision into action. At 600 miles per hour, this can be converted into an absolute forward displacement of 352 feet.

Interpreting And Deciding

But the most confounding of all are the requirements for interpreting and deciding. When the pilot's eyes behold an object before him in the sky and the message is carried to the seeing center of his brain, it takes a definite measure of time for the significance of that object to be catalogued. Is it a star or a spot on the windshield, and thus unimportant to the course of his flight? Or is it a weather balloon or another aircraft, and thus a potential threat to his survival? In other words, what is seen must be recognized and evaluated. Even with the maximum of alertness and the greatest of familiarity with objects to be encountered in the sky, such recognition is computed to take at least one-half second, and probably takes longer.

The decision of what to do after the significance of an object or event is understood is the most variable of all. Ordinarily, decisions which must be made when life and death are at stake require a profundity of reflection, a weighing of factors, and the eventual distillation of a choice. But the pilot who holds his own life and often the lives of many others in the balance has no time for reflection. When a hostile object appears in the sky before him, he must decide instantly whether or not he should turn his aircraft, and if so whether he should turn up or down, or right or left, and whether he should slow his speed or accelerate, and even whether or not his plane can structurally stand the maneuver he is about to attempt. His decision must be correct. It is difficult to compute the minimum time in which a pilot can conjure up the important factors to be considered in making such a decision, weigh them, and arrive at a choice. It is probable that four or five seconds will elapse. It is possible that he can decide within two seconds, although such instant decisions must be attended with an element of luck to be successful.

Thus, in the alert and fortunate pilot we can expect a minimum of two and a half seconds for his recognition and decision. When we consider the added time of his perception and reaction, we are faced with an absolute minimum requirement of three seconds of time. During this period, while flying at 600 miles per hour, he irrevocably traverses 2,640 feet of space or one-half mile, regardless of impediments or danger, regardless of desire, decision, or action to avoid it.

If he is on a collision course with another aircraft, this space deficit will be doubled. The significance of man's inability to cope with such rates of closure was dramatically illustrated last year by two young pilots. They were flying high-performance jet fighters and had been practicing simulated air-to-air combat maneuvers. Apparently tiring of chasing one another, they announced that they were going to separate a few miles and try a head-on pass. Another pilot who heard this statement immediately warned them against such a maneuver. Whether they did not hear or whether they simply disregarded instructions will never be known. The only certainty is that it was their last mortal decision. They collided with the explosive impact of two gigantic bullets. Yet little else could be expected. Their closing speed was over 1,700 feet per second! Paradoxically, it was their acuity of vision and sureness of action which allowed them to establish their tragic course. They simply failed to reckon with their own physiological inertia.

Ability Of Perception

This brings up another consideration which is difficult to compute, but which is growing in significance as the speeds of flight increase. This is the probability of perceiving the warnings of instruments or of seeing outside obstacles which are detrimental to flight. It is obvious that instruments telling of the flight path, fuel reserve, and other items cannot all be watched constantly or thus interpreted instantly when dangerous situations or levels are reached. Therefore, the pilot sometimes finds that he has placed himself in an untenable position, such as running out of fuel, through oversight or while having his attention diverted to other things. But of greater concern and of ever-increasing magnitude as the speeds of flight increase is the probability of seeing a collision object outside the aircraft. It is obvious that the pilot cannot see a mountain in front of him while flying in the clouds, or unlighted obstacles while flying at night. However, less obvious is the improbability of seeing an object outside of the cockpit even on a clear day. The following event is revealing:

A pilot of a jet bomber was recently flying at 30,000 feet at eleven in the morning on a clear day. He made a slow turn and was startled to see three other jet bombers approximately one mile away and on a collision course toward him. He did not have time to react or alter the course of his aircraft during the three or four seconds of closure, and shot through the formation, missing the nose of the first aircraft, flying under the second, and flying over the third. As he went over the third bomber, one of his engines hit the upper portion of this bomber's tail and knocked it off. The pilot who flew through the formation then returned to home base, landed, and recounted his experience. Inasmuch as no report had been received from the formation he had flown through, it was called and requested to land. When it landed it was found out that the formation consisted not of three aircraft, but of six. The aircraft whose tail had been hit was not significantly damaged; it was a matter of small concern. However, of great amazement was the fact that neither the pilot, the co-pilot, nor the observer in any of the six aircraft of the formation had seen the other bomber fly through them!

Need For Attention

How is such a phenomenon explained? It is partly explained by the fact that modern flying requires a great breadth of attention to a great many instruments and objects, and it is not possible to be constantly on the alert for a collision object. But mostly it is explained once more by the lag of the human mechanism. It is seldom that an image falls directly upon the fovea

or the central visual point of the eye. Instead, the stimulus falls on some off-center area and the eye responds by turning toward the stimulus. This takes time. And then after the eye is directed toward the stimulus, it must be focused. Like a camera lens, the eye needs time to bring the image sharply upon the fovea. And in the vastness of space where there is little in the outside realm to command attention, eyes tend to become focused on recognizable things in the cockpit or to be relaxed and follow the effortless pattern of looking at the nothingness that lies a few feet ahead. For in the concealment of the cockpit it is impossible to grasp the magnitude of conditions outside. Only an occasional individual such as test pilot George Smith, who ejected at 700 miles per hour and miraculously survived, can give us some clue as to the real meaning of flight, and of nature's monstrous resentment.

These events signal an era of new and changing conditions. And when conditions change, life must adapt or die. Fortunately man is a highly adaptable animal, and it is his ability to adapt which will undoubtedly allow him to inhabit the missiles of the future and survive. But inasmuch as the penalty for error is extremely harsh in the occupation of flying, we might do well to anticipate some of the future requirements and lower the cost. Although all of the dangers which lie ahead cannot be foreseen, a few at least are obvious.

Seeing And Evading Obsolete

The most apparent of these is that as speeds increase and as the number of aircraft multiplies, the age-old method of survival by seeing and evading will become completely obsolete. Closing speeds will be so great that a pilot will be committed to a mid-air collision even as, or before, he sees another aircraft. Uninterrupted flying will thus become completely dependent upon strict, accurate air traffic control. And unless man soon makes these laws, and keeps them inviolate, nature will exact the death penalty.

Another fairly obvious conclusion is that the speeds of future flight will commit an aircraft and its occupants to a definite and unalterable course that will involve irrevocable miles of distance in the few seconds required for the human operator to perceive, to decide, and to react. These requirements are absolute and can in no way be eliminated from the occupation of flying. However, there is an evasion which is not only possible but highly practical. This is taking the requirement of decision and accomplishing it *before the flight takes place*. It is current practice to plan carefully the anticipated course before each flight. This is the only sensible method of avoiding fixed obstacles. However, there are countless additional decisions the pilot still must make in flight, and he sometimes errs and accidents result. If the majority or all of such decisions could be made before he leaves the ground, they could be attended with greater thought, be more accurate, and not demand the irrevocable block of space which accompanies in-flight decisions. Although this may seem to deprive the pilot of much of his independence, it is nevertheless highly practical. Successful flying operations, both commercial and military, are resorting more and more to this rigid discipline. Furthermore, it is the gospel of test pilots. More than anyone else, they endeavor to preconceive every hazard or hazardous condition before it arises. Then when emergencies occur, they only need to perceive them and react. The decision has already been made, and their immediate reaction is unequivocal and life-saving. And this is a peculiar twist in the pattern of survival, for the life-saving decisions do not come between what man sees and what he does, but the decision comes first of all. This altered sequence might well become the law of future flight.

Responsibility Of Engineers

However, if airborne man is to survive, the greatest responsibility of all falls upon those who design and engineer and produce aircraft. For the man in the cockpit is mortal and he is limited. Therefore, aeronautical science must understand him well and adjust the miracles of progress to his slow chemistry and his propensity for error. Thus the challenge. It is a challenge to develop and provide simplicity of perception, clarity of interpretation, and ease of manipulation, even as the aircraft themselves become ever more complex. And the requirement is absolute. If design should neglect or complicate the human lot, man cannot help destroying the fabulous machines of the future, and all who occupy them.

(*Reprinted from* The Atlantic, *July, 1956*)

Flight-Time Limitations

(*From* The Australian Air Pilot)

An affinity between the present-day pilot and the space-man of the future has arisen with the worry about excessive flight-time.

The space-man is aware that current rocket speeds are reasonable for flights within the solar system, but are hopelessly slow for interstellar voyages.

The speed of light is accepted as the limit for trips within the material universe, at that speed a space-man can only hope to reach nearby stars within a generation. This appears to place a limit on man's interstellar travel. However, some scientists see hope in "time dilation", which in part, is Albert Einstein's theory of relativity.

On a spaceship cruising at the speed of light, time by relativity would slow down, and the chemical processes that make its crew grow old will run slowly also. When a spaceship reaches its destination thousands of light years away from earth, the crew will be almost as young as when they left home. If they return to earth where time has been elapsing at its normal rate they would notice changes. All their friends would have died from old age and nations would have disappeared.

Science has argued the possibility of relativistic time dilation giving a type of immortality. Theoretical proof that high speed can postpone at least one kind of death has been offered by a scientist using mu mesons instead of sending human beings into space.

The average life of a mu meson at rest is some two millionths of a second, but at speed they have a comparative immortality. On the same calculations a man would live to some 1,400 years.

Critics of the time dilation theory claim that as a spaceship slows reaching its destination, there will be a quick aging effect on its crew, cancelling the years gained by high speed travel. The mu meson research shows this is not so. Should the homeward trip be made at a comparative snail's pace the age advantage is retained. If he does return at high speed he should double his age advantage.

For Safer Flight Crew Stations

If We Accept The Inescapable Fact That Some Accidents Can And Will Occur, Despite Our Best Efforts, Designing For Crash Survival Must Be Given Its Share Of Attention

By A. Howard Hasbrook

Director, Aviation Crash Injury Research, Cornell University

Having been a pilot since 1930, I feel that I am one of you—as well as being a crash-safety engineer—and that I can discuss for a moment some of the foibles of pilots.

In our innermost mind we feel that an accident will never happen to us so long as we exercise reasonable precaution, adhere to the rules and don't stick our necks out. This thinking also prevails when we get into our automobiles to drive to the airport. Unfortunately, our *personal* actions—as pilots or drivers—are not always the determining factors in averting or producing accidents, as the 1955 aviation and automobile casualty records show.

Highway Vs. Air Fatalities

During that year more than 40,000 persons lost their lives on the highway. In aviation, we had 40 accidents involving scheduled air transports; nine of these were fatal, killing approximately 160 persons.

Despite the fact that air line travel —on a passenger mile basis—is 40 times safer (according to statistics), the records certainly show that accidents do happen! And we can expect accidents to occur from time to time, in spite of our best accident prevention work.

Why? Because (a) we are dealing with an ever-changing art and (b) thousands of unpredictable factors—human beings—are involved in the complex operation of designing, building, maintaining and operating our aircraft.

If we accept this fact—that accidents will occur—(who among us has never cut his finger, stubbed his toe, forgotten to do something important, etc.) we can then direct part of our attention to designing for crash protection.

Naturally, some aircraft accidents are so violent—flying into a steep mountainside at cruising speed—that no amount of crash-safety design could alter the fatal consequences.

Survivable Accidents

However, a certain percentage of air line (and automobile) accidents are of a survivable nature—with regard to the decelerative forces applied, and the resulting damage to the cockpit and cabin.

In 1955, for example, approximately 22 per cent of the fatal air line accidents *involved survivable conditions of crash force*—but these accidents accounted for *19 per cent of the year's fatalities.*

Although it is difficult to give precise figures for the automobile accident picture, one can safely estimate that at least 50 per cent of the fatal auto accidents were also survivable in nature. This means that approximately 20,000 persons died under conditions of crash force which was easily survivable. If crash-safety design had been incorporated in these automobiles —and if the occupants had worn well-anchored strong safety belts, they would have survived! In addition, more than third of a million auto passengers would have sustained lesser degrees of injury—or no injury at all in many cases—in last year's accidents.

Those auto statistics are referred to here because each of you use automobiles to get back and forth between your homes and your cockpits.

Erroneous Opinion

Numerous pilots have an erroneous opinion that crash protection in the cockpit is a waste of time "because a cockpit is always demolished in an accident of any consequence." This quotation is a fallacy. Certainly an airliner flying into a mountain sustains destruction of the cockpit—and of the entire aircraft. But what about the 240 Convair crash at Springfield, Mo.? A 140 knot crash at night, but the cockpit remained intact—one pilot lost his life, the other his career because his eye was torn open. What about the fatal and serious injuries in the 340 crash at Chicago and in the DC-3 crash in New Hampshire? The cockpits were relatively survivable but death occurred because agreement was never reached in the early days on what kind (and how much) crash protection should be incorporated in cockpit design. Part of this problem lies in our complacency about our involvement in accidents.

It is a known fact that only a very small percentage of the population will wear safety belts in cars—some passengers even resist wearing them in aircraft. How many of you have, and wear, safety belts in your automobiles? Before you ask, I'll state that I have safety belts in my car and I have worn them for more than five years and over 100,000 miles of driving.

High Speed No Factor

One of the greatest deterrents to getting—and using—crash-safety design and equipment in aircraft cockpits and automobiles has been the erroneous impression that high speed is necessary to cause death or serious injury in an accident.

Nothing could be further from the truth. Low speed can be just as killing under the right circumstances. Injuries can and will vary in their seriousness, depending on the area of the body which is injured, and the pressure distribution involved. For example, when you sit in a chair you are exerting the force of only one g against the chair seat—and against your buttocks. If your buttocks cover an area of 150 square inches (about average) and you weigh 150 pounds, the average load against your buttocks is one pound per square inch. Now, let us change the situation by incorporating a potentially lethal item in our environment; we install an icepick—point up—on the chair bottom. We then sit down slowly on the chair—and on the icepick! The point of this icepick covers, perhaps, an area equal to say, 1/64th of an inch—it's a blunt icepick. Our entire weight of 150 pounds is now borne by a tissue area of only 1/64th of a square inch. This is equal to a pressure of almost five tons per square inch—and far exceeds the pressure tolerance of our tissue, resulting in penetration of the icepick up into our body—and injury.

Such injury in this area might not be particularly dangerous insofar as death is concerned, but suppose you

were slowly lowered, *head downward,* on this icepick? It would penetrate your skull, pierce the brain, and you would die, under a condition of only one g and very low velocity.

Likewise, a six-foot fall on a hard pavement can easily kill you. A six-foot fall results in approximately a 13 mile an hour impact. If the surface struck by your head is *non*-yielding, the deceleration (stopping) distance of your head is only that which takes place in the compression of the scalp tissue and in the inbending of your skull. In this case, about one square inch of skull area would be involved during the contact.

An impact velocity of 13 mph in relation to a one-quarter of an inch stopping distance (inbending), would produce a deceleration of almost 300 g. Assuming a skull weight of 10 pounds, the impact force applied to the one-square inch of your head would be in the order of 3,000 pounds PSI. The skull cannot withstand this load without failure—such failure results in laceration of the brain and death occurs.

Lists Danger Spots

What does all this mean to crash-safety design for crew stations? It means this: vital areas of the body—the torso and head in particular—must be prevented from striking, or being struck by, rigid structure or objects which can impose heavy impact blows on small areas of the body or head. Rigid knobs, boltheads, window frames, latches, fire extinguishers, and other such items must not be permitted to contact the human body in accidents in which the aircraft structure is not demolished. This means—first—that effective—and strong—floor structures, seat anchorages, seats, safety belts, shoulder harness and anchorages for interior components must be provided.

Certainly, the tie-down strength of these items should not be less than the strength of the overall fuselage structure—equal, statically, to a dynamic load of 20 g or more.

Secondly, objects and structures within the "flailing range" of the head and body should be delethalized (padded, shielded or constructed of yieldable material) so that bodily contact will not result in concentrated loads which exceed the tolerance of the body part involved.

Third, protective head gear—lightweight crash helmets—should be provided for those crew members who occupy structural environments which do not—from a practical viewpoint—lend themselves well to delethalization.

Fourth, the crew must use the protective equipment provided, not only in known emergencies but during all take-offs and landings, for, as the records show, a large percentage of accidents occur during the take-off and landing phases with no advance warning!

Delethalization And Tie-Down

Thus, to have crash safety in crew stations, the design engineer must provide delethalization and effective tie-down, and we—the pilots—must make use of it, for what good is a 20 g harness if we are not wearing it when the aircraft bellies onto the ground?

The need for such crash-safety design consideration becomes increasingly important when one realizes that we will be carrying as many as 230 passengers in some of our future jet transports. The number of crew members in these airplanes will probably number not more than seven—three cockpit members and four cabin attendants. This is approximately one crew member of each 33 passengers. Compare this with our current piston-driven aircraft in which we have an average of one crew member for each 12 to 13 passengers. This means that in an emergency evacuation involving one of the jet aircraft, each crew member will be responsible for 2½ times the number of passengers that he—or she—is presently required to look after.

Thus, to insure the crash safety of these passengers—as well as that of the crew—it is imperative that we "raise our sights" in determining the requirements of crash-safety protection of crew member stations.

For too long a time, many of us have been too prone to look upon the cabin attendants—particularly if they were females—as a necessary evil and of little value other than to keep the passengers happy during the flight. If one looks at the picture objectively, one realizes that each crew member—whether he is a pilot, engineer or the "lowly" cabin attendant—carries a terrible responsibility—a responsibility for the life or death of dozens of human beings.

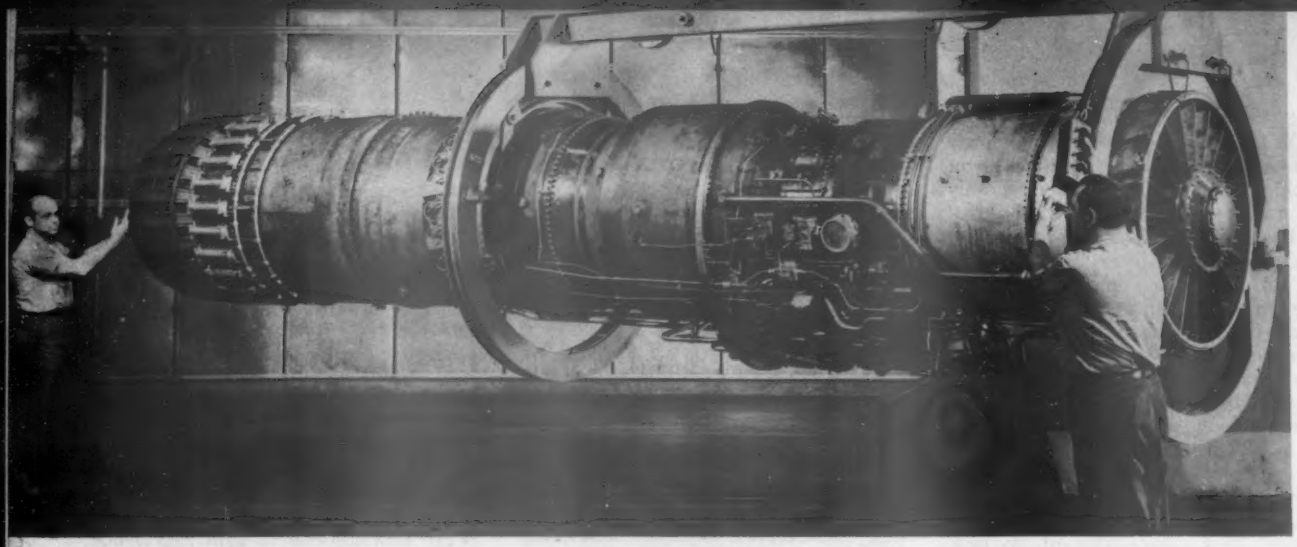
In the past, crew members have—through their courage—saved many lives during evacuation from burning aircraft and during emergency ditchings. However, they must be in position—healthwise—to use this courage and fulfill their responsibility when the occasion arises. To do this, the crew member must be given adequate crash-safety protection—and he must utilize the protection provided.

Action Needed

Without going into detail as to specific design of the cockpit, the air line pilots as a group, should bring to the attention of the design engineer the need for designing the cockpit for crash safety. However, since design engineers have many other problems, potentially lethal or hazardous items can "creep" into the cockpit without warning. For example, the windshield frame may have been initially designed with a protective—energy-absorbing—shield to reduce the possibility of severe head injury. However, somewhere along the line, an air line cockpit group may decide that a sunvisor is needed to shield the pilot's eyes from glare. At this point, unless someone with experience in crash-safety design keeps his eyes open, a rigid and potentially hazardous attachment unit—for the sun shade—may be installed on the windshield frame in such a way that it would surely pierce the pilot's skull—if he is thrown against it during a minor incident, such as the collapse of a nose wheel. One answer to this problem is to give one person the responsibility of conducting periodic crash-safety evaluations of the design of the cockpit as it progresses.

In the past, it has too often been the practice to fit the cabin attendants into whatever space was left in the cabin after the design and location of all other cabin components had been "frozen." Consequently, the cabin attendant sometimes found himself sitting in an environment literally studded with "icepicks." Sharp, rigid corners on adjacent galley equipment, main door handles of sufficient mass to break the skull, baggage racks ready to spill heavily loaded suitcases on their heads, fire extinguishers and other "loose" equipment directly in line with their heads—potential missiles with an injury potentiality of a sledge hammer. Here too, a critical eye must be used during the design stage if adequate crash-safety protection is to be given the cabin attendants. Certainly, the degree of crash protection provided for the cabin attendants should be no less than that given the passengers—for the passengers' welfare may ultimately depend on the ability of the cabin attendants to perform their emergency duties—a badly injured or dead crew member is a liability, rather than an asset, in evacuating people from a burning aircraft, or in preparing life rafts after a ditching.

(Continued on Page 23)



J-75 Powerplant

A Pratt & Whitney Aircraft J-75 turbojet is shown as it moves from final test at the East Hartford, Conn., plant of United Aircraft Corp.'s engine division. J-75's will power Boeing 707 and DC-8 transports.

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A Dual Role — Captain And General

ON LEFT: Capt. Clayton Stiles preparing to depart Idlewild with UAL SFO. A former Chairman of Council 52 and Chairman of the UAL Stiles is currently a member of the Military Reserve Study Committee by the 14th Convention. (The Committee's other members are: R (AA), Chairman; V. A. Peterson (EAL), S. W. Hopkins (DAL); C. E. L Reg. III V.P., advises as representative of the Executive Committee.) BELOW: Brigadier-General Clayton Stiles, Commander of the 514th T Wing (M), the "Long Island Wing" of the Air Force Reserve. G shown reviewing plans for the Annual Encampment of the 514th, Sept at Grenier Air Force Base, Manchester, N. H. He has commanded th cated at Mitchell Air Force Base, N. Y., since June 6, 1953.

The ALPA Camera

Father-Son Team

PAA Capt. J. Y. Craig and Third Officer M. W. Craig hopped the Atlantic together recently. Young Craig joined PAA in March, just 16 years after his father. The Captain is a DC-7 pilot, while his son is in DC-6's. On this trip, however, young Craig went along as extra crew member.

d General

Idlewild with UAL non-stop for
an of the UAL MEC, Capt.
Study Committee, established
member are: R. A. Dooley
ns (DAL); C. E. Luther (CAP),
ive Committee.)
er of the 514th Troop Carrier
Force Reserve. Gen. Stiles is
of the 514th, Sept. 29-Oct. 13,
as commanded the 514th, lo-
6, 1953.

Capitol MEC

Shown during its initial meeting at the Home Office is the Capitol Airways MEC. The carrier's 70 pilots recently joined ALPA.

Profile Of The Men Who Fly

What Kind Of A Man It Takes To Maneuver Today's Heavy, Complicated Aircraft, While Dealing with Variables, Inaccuracy Of Data, Mechanical Breakdowns, Crew Problems, Etc.

By Capt. F. E. W. Smith
Canadian Air Line Pilots Association

The series under "The Air Line Pilot" title has attempted to explain an air line pilot's job in terms other than as an airplane driver, to sketch some of the relationships which are integral to it and some of its problems.

In review, the series started with a definition of an air line pilot as a professional man and not as a technician or tradesman as some choose to regard themselves. Ethics followed naturally, for these are the cornerstones upon which professions are built. The occupation was then described as a task of command requiring decisions of vital importance, and some of the relationships an air commander must deal with were touched upon. An article on weather outlined some of the difficulties of the forecaster with the intent of warning the new pilot against taking his briefing too literally and of persuading the old pilot to be humane in his judgment of those who try to outguess the fickle movements of air. An article on the dispatchers described their need and use in an attempt to help pilots to a more mature relationship with them which would neither demand the degradation of dispatch to office boy level or conversely hand the reins to their willing hands. An article on safety developed a concept of it as "a way of going" and further defined the pilot profession as one of calculated physical risk. And finally an article on the "books" tried to show that while these warrant respect and obeisance, there are times when a pilot must make rules of his own to fit his circumstances.

The Pilot's Concern

The choice of subject matter which has been included may not fully cover the nondriving problems of the pilot, but at least shows that pilots have much more on their minds than the primary control of equipment.

Of course, ability to fly is basic. It has often been thought desirable to divorce the command requirements of flight from the actual flight control by having a commander on board, selected for executive ability and not necessarily a flyer, who would make all decisions and to whom the pilots would be subordinate. This has never been successful and will never be because, in airman work, the executive side of the operation is so completely woven into the steering side that the two cannot be separated. The pilot must be able to do both sides. He must find time to consider and make decisions while involved in intricate instrument procedures or control difficulties. His flying skill must be so highly developed that he is able to do this part of his job with but part of his brain and have room left for other matters, which may range from minor passenger or crew problems to matters of import, such as points of no return or abandonment of the operation. As the control of the aircraft, under bad conditions, is a task requiring a great deal of concentration, his need of ability to think beyond the control imposes a heavy load on him. The only way it can be lightened is to become increasingly expert in technique, making this part of the total load easier. This is perhaps why pilot training tends to concentrate on actual flight, which schooling takes up practically all available training time and so forces the equally important executive side to the background and a hoped for native ability.

Analyzing The Pilot's Role

What kind of a man is the pilot who can expertly maneuver the heavy and complicated aircraft of today and deal simultaneously with variables, inaccuracy of data, mechanical breakdown, crew problems and anything else which comes up? Are there personality characteristics common to all pilots which are necessary if they are to succeed in this very demanding occupation? The most immediately noticeable one is that pilots are basically individualistic. They look different, come from any background, have widely diverse interests, seldom agree with each other on how to do their job or on anything else. On any subject under pilot discussion there may be as many points of view as there are pilots in the group. This individuality, distressing to the management and to council chairman types, is an essential characteristic of the pilot, for no man without a mind of his own can be relied on on an aircraft flight deck.

Indicated by individuality and common to all pilots is intelligence. This is not an occupation for the mentally dull for it takes an able mind just to learn to fly, and an abler one to fly and think. Usually the pilot is especially inclined to the mechanical and mathematical and always he has a mind capable of keeping track of many details and of performing repetitively without serious mistake.

Another common characteristic is a strong navigational sense which is a difficult thing to explain but is real and is possessed by all good pilots. This is not so much an ability of reason and applied mathematics as it is something akin to the bird's instinctive knowledge of position. It is this which enables pilots to have a good idea of where they are, after a long session of dodging thunderstorms or of flying without radio aids and which often enables them to disagree successfully with the navigation data offered them.

Good reactions and quick, accurate troubleshooting skill is necessarily possessed by all competent pilots. They are basically cautious men who have, however, a common ability to calculate a risk and a cool nerve in emergency. Finally, the pilot has the ability to control himself when under great strains which may be produced by incidents ranging from the inconsequential up to a ditching situation or worse.

What Makes A Pilot?

These few characteristics are common and essential to all pilots. The question now arises: Is the profession one, which almost any interested person can succeed in or is the necessary combination of personality traits comparatively rare? This is a difficult question to answer specifically, but one of considerable interest because of the quite common pilot belief that anyone can do his job, he winning it by virtue of

a successful medical examination and for no other reason.

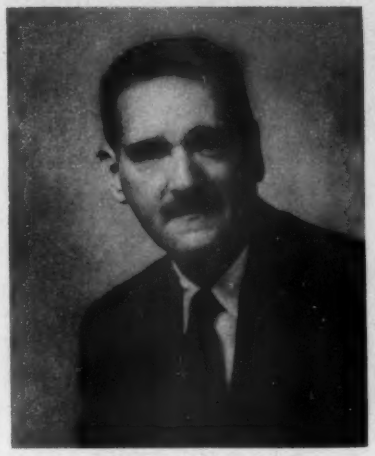
It is agreed there may be many men who are admirably suited to this work but who are disqualified by medical defect or over age. It is not agreed that the total group of potential pilots is a large one. An industrial psychologist, surveying personality requirements, could likely say with fair accuracy how many men per thousand are possible pilot material. An empirical answer is closer at hand through observation of industry experience.

There are three basic principles in human behavior which are important to the answer of this question. First, known to all advertisers, is that people will usually get what they have a desire to get—somehow—entirely or in part. Second, that people have no desire to try to do things for which they are not suited. Musicians are musically minded, artists artistic and athletes athletic. Third, if people make a mistake and seek to do that for which they have no talent, they back away as quickly as they can.

Looking at the civilian schools it is clear that many wish to learn to fly and are able to pass the medical requirement. But many who start, drop out while being trained. Some are washouts, of course, but others find flying not too interesting, or too expensive, or have some other excuse. Loss of interest indicates failing of desire which occurs when incompetence is discovered (usually long before the instructor discovers it). Lack of money is just another way of getting off, for advertisers will say the money would be found if the desire existed.

The desire should be strong. We live in an air age and could expect large numbers of young men to be interested in an aviation career. Piloting is the best job in aviation, paywise, in working conditions and in prestige. Air line flying is the best flying job in aviation, with the possible exception of a very few, highly favored, executive pilots. One would think air lines would be deluged with applications for pilot jobs. The fact is they seldom have so many that they can pick and choose exactly as they would like. The belief that anyone can do an air line pilot's job provided he can pass a medical, is not borne out by the competition in employment opportunity. Flying is a very attractive way of making a living. It seems quite safe to state that if the average young man felt he could do the job, the supply of candidates seeking employment would be much larger than it is. It is quite true that if a man is not suited he is not interested.

Meet Your Officers



David Halperin

Recently elected as new Vice President of Region IV was Capt. David Halperin (TWA), Shawnee, Kansas.

Halperin, 42, a graduate of the College of Engineering at New York University with a B.S.M.E., Aeronautics major, began his flying career immediately upon graduation in June, 1936, joining the U. S. Navy as an Aviation Cadet. He took his flight training at Pensacola, Fla., was designated as Naval Aviator, and assigned to a scout-bombing squadron aboard the U.S.S. Enterprise in October, 1937.

Halperin joined TWA in 1940 as First Officer, however was recalled to active duty in the latter part of that same year under a limited emergency proclamation and spent the entire World War II in various operational squadrons of the Atlantic Fleet. Upon conclusion of the war, he returned to TWA and qualified as Captain in 1949.

The new ALPA Vice President has been active in various Association activities since 1952, primarily in the engineering and air safety fields. He was named TWA Central Air Safety Chairman in 1956.

Married and the father of David Richard, 13, Halperin's major interest, outside of the piloting profession, lies in the art field. He is an accredited student at the Kansas City Art Institute, major in Graphic Arts, and expects to graduate with a Bachelor of Fine Arts in 1959. Several of his prints dealing with aviation subjects have been accepted for exhibition in top art shows in the midwest, e.g., at the Joslyn Museum, Omaha, Neb., the Art Museum at Springfield, Mo., and the Nelson Art Gallery at Kansas City, Mo.

Few Men Suited To Fly

Wartime memories bear out the contention that very few men are really suited to the air. Then, when most people were in some uniform or other, just about everyone who could possibly make a go of flying was put to it. The majority of these wartime pilots felt so ill at ease in the air they lost no time getting out of it on discharge. The few who took to it are almost all in aviation today in one way or other and most as airmen.

Pilots have no reason for feeling the medical rating is their only difference from the general populace. They are entitled to feel proud, not only for their healthy bodies, but for possession of above average intelligence and a combination of personality traits which enable them to do their jobs and which will stand them in good stead in any walk of life. But the pilot group in general feel quite insecure about themselves, worry about what they might be able to do if they were medically grounded, and about the possibility of having to live, from early middle to ripe old age on the product of a retirement fund. As a class we probably put a larger proportion of income into savings, life insurance and retirement plans than any other producing group and buy extensively of sickness, accident and loss of license protection.

The usual explanation of this sense of insecurity is the ever-present medical re-examination and the fact that medical requirements may be changed at the whim of the doctors and company executives. But while the present medical policy keeps entrance standards as high as ever, it does relax them for older pilots to try to provide a full working life for those engaged. It seems that pilots are valued for their experience more than they are for their health. This makes sense. The air lines wish to employ men who can fly their airplanes safely for many years. It is pretty difficult to interview an applicant, even with aid of psychological tests, and be sure the man selected will

Former ALPA Treasurer Marks Milestone With TWA

A former ALPA Treasurer, Capt. Roger Don Rae, recently marked his 20th anniversary with TWA. He is the first Chicago-based TWA pilot to complete 20 years. Born in 1910 in Bay City, Mich., Rae began his flying career as a private pilot in 1930. He joined TWA in Kansas City in 1937, and has been based in Chicago since 1940. Capt. Rae joined the Association in 1938 and holds Membership No. 1505. He served as ALPA Treasurer during the years 1953-1954.

suit. There is wastage among probationary first officers. A man is a captain for quite a while before a company feels really confident of its choice. Thus it is better to hang onto men who are tried and proven than to replace them at the first opportunity.

The Pilot's Insecurity

Every pilot in the business knows the medical policy and probably does not really feel it will change, yet the feeling of insecurity persists unabated. Perhaps the usual explanation of its cause is not the correct one. It is suggested that pilots may feel insecure because they work out of man's natural element. In a very real sense their lives are at stake every time they take out a flight. Their basic inadequacy, their smallness in comparison to the forces they expect to manage—including the airplane they are flying—is made constantly apparent to them. A fear exists and yet there is no reason for fear. The pilot is doing something he has done many times before, something for which he is highly trained and well suited. The weather is good, the trip routine, the equipment excellent and well maintained. Could it be that pilots transfer a healthy fear of the air into a fear for their futures? Is this why we are such good savings and insurance customers and why we are so convinced we must expect early retirement? Do we wish to leave the air before it finds us out?

No one can answer these questions, of course, but one may speculate on the effect of the pilot insecurity feeling on the profession generally. Like the other professions pilotage is a comfortable status to attain once line captain rank has been reached. The captain is on a sort of plateau. He can stay there the rest of his life if he wishes and not suffer from a frustrated ego. Or he may go higher up the peak of ambition if this is what he wants. He can have a minimum interest in his occupation without fear of being pushed downward, or he can express a keen interest without being forced to climb higher. The rewards are good and he cannot proceed beyond line captain rank without giving up a lot in order to get more.

Doctors, lawyers and to some extent engineers are on this same plateau. Many of them, being intelligent and very interested in their occupation, express their vitality and interest in work which advances the achievements of their profession. The medical doctors, for example, develop most of the new techniques and discover many of the drugs which advance medical science. It is right that pilots, having attained a similar status, and being intelligent men who have obviously a very great interest in their occupation, should act in similar fashion and be active in the development of the aviation business, which in itself is one of the most rapidly changing of man's many activities.

The extent of pilot participation in aviation development is going to determine the degree of advancement of pilotage as a profession and occupation. Most pilots, whether prepared to do anything themselves or not, do feel they are the key figures in the business and should have much more say in its operation and development than they do. There is a fairly widespread opinion, which the writer shares, that pilots could and should control the licensing of pilots in much the same way that doctors license doctors, lawyers license lawyers, etc. The material advantages of such an arrangement are quite obvious. So too are the advantages of prestige which would accompany such a privilege. But long before such could take place it is necessary for pilots to demonstrate they are in fact the key members on the air line team. This cannot be done by proclamation or by limiting interest to the flights assigned. It requires a demonstration of leadership in the development of aviation. More pilots than at present must be willing to study the problems of the business and apply to these their special knowledge, special skill, and time-space perception.

A Summation

This brings both this article and the series to its conclusion. The intent throughout has been to widen pilot vision of their occupation and themselves. It is hoped the work will accomplish this purpose among some and that it may be useful as a guide to new pilots whose ideas and habits are not yet fully formed.

A clear, precise, understanding of "what you are" is vital to success in any field of endeavor. Without it there is nothing but confusion, wasted effort, poor output. While the pilot role might be obvious—to drive airplanes—what he shall be while he drives them has been in confusion ever since the business started and this confusion does affect how well he "drives" his aircraft. These articles have tried to prove the air is a place where only professional captains may find full success and to show that everyone in the business is in reality a professional "captain" even if he himself energetically denies it. Some may feel the pilot status has been overglorified, the difficulties of air line flying magnified. The writer does not think so, but if such has been done the error is on a good side. Generally speaking it is better to think too well of yourself than too little, for no one who deprecates himself has ever done anything or gone any place.

Consumer Price Index: What Is It?

In Pilot Negotiations, In Discussions Of Pilot Wage Theories, It Is Mentioned Often. It's Interesting To Note What It Is And What It Isn't

By M. R. Robinson
ALPA Research and Statistical Department

It is probably a safe assumption that to most air line pilots, the mountain of government statistics emanating from Washington is usually of little interest. The reason for this is that in the everyday walk of life, air line pilots have little or no opportunity to come in contact with the vast gamut of government reports, bulletins, and releases turned out by the federal government. Few have any practical application to the air line piloting profession specifically, although a greater number are of use to the industry generally.

However, if nothing else, virtually everyone has heard or made reference to the term "Consumer Price Index." It is mentioned often in relation to air line pilot collective bargaining activities. It is almost sure to be alluded to in discussion of pilot wage theories and philosophies.

But what, exactly, is C.P.I.? The answer may be of interest to many air line pilots.

Index Explained

The Consumer Price Index measures the average change in price of a fixed "market basket" of goods and services bought by the wage earner and the clerical worker families living in cities. The complete name of this Index (which is compiled by the U. S. Department of Labor, Bureau of Labor Statistics) is "Index of Change in Prices of Foods and Services Purchased by City Wage-Earner and Clerical-Earner Families to Maintain their Level of Living."

This Index is perhaps more widely used than any other index, due to its application in escalating the wages and salaries of several million workers. By the same token, it is probably scrutinized more carefully than any other. During a congressional investigation it was concluded that the Index "merits the widespread confidence which the users have expressed in it, and further stated that as the most important single statistic issued by the Government, it must be technically accurate."

History Traced

The Consumer Price Index is not a symbol of our modern way of life. As a matter of fact, its origin dates back to the 1890's when a detailed summary of prices of food was undertaken by the Department of Labor. It wasn't until World War I, however, that the Index was given prominence. In 1918, an investigation of the cost of living of workers in war centers was undertaken by the Bureau of Labor Statistics. Based upon the information from this study, a complete cost of living index was prepared with six major groups: food, clothing, housing, house furnishings, fuel, light and miscellaneous.

The Index, based upon information collected at that time, was carried back to 1913 and has been maintained continuously. During this period of time, the Consumer Price Index has been the official index of the cost of living of wage-earners and clerical workers in the United States and has been used as an indicator or changes in retail prices. During the years that followed, it became apparent that the index as developed during World War I had several serious defects in it.

Revised In Thirties

During the years of 1934-1936, several government agencies cooperated to revise the cost of living index to a more realistic and accurate guide and this new Index was published in 1940. However, the real growth in the use of this Index did not come until the post-World War II years and because of its greater use, its technical accuracy was attacked. During the Korean War, congressional esteem was brought to bear to remove and correct any deficiencies which the Index might have. After three years of work and with the counsel of advisory committees of professional societies, business and labor groups, the Bureau of Labor Statistics published the first index of its latest revision in January, 1953. This index is expressed in terms of 1947-1949 as the base years and retail prices in this period equal 100.

Aims Outlined

The Consumer Price Index is designed primarily to measure price changes independent in quantities and qualities of goods consumed. In its revised form, the Consumer Price Index is described as a "measure of the average change in prices of goods and services customarily purchased by families of wage earners and clerical workers living in cities of the United States." The purpose of the index is to measure changes in prices only. It does this month after month by comparing the total amounts of money required to purchase the market basket of goods, and services—amounts and kinds—that families bought in 1952.

The shopping list that represents the market basket is based on consumer purchasing in 1952. To determine what consumers in the U.S., on the average, included in their total market basket the bureau made a survey of consumer expenditures in 1950.

The bureau could not take a complete census for this purpose, but it did obtain the necessary information from a sample selected so as to represent the urban population in the United States. This sample included families residing in a representative group of 91 cities including all the 12 urban areas with populations over 1,000,000, and a selected number of large, medium-sized and small cities. The cities were selected to represent the various urban and geographical characteristics (size, climate, density of population, level of income, etc.), that affect the way families spend their money. A representative of the BLS visited each family and arranged to obtain a complete and detailed record of the kinds, qualities, amounts, and expenditures for food, clothing, furniture, and all kinds of goods and services the family bought in 1950. The totals and averages were then adjusted for changes between 1950 and 1952 to obtain "the basic market basket" for 1952.

No Absolute Accuracy

The Price Index cannot be absolutely accurate, however, and any de-

parture from the true change in price causes an overstatement or understatement of the "derived" increases in the standard of living. For example, the Consumer Price Index does not make any adjustment for improvements in quality in our passenger automobiles, the clothes we buy, the larger TV sets and so on. In this sense the Consumer Price Index overstates the extent of the price increase over the long term because it does not make allowances for the increased value put into many products and causes an understatement with respect to the increase in the standard of living.

The Consumer Price Index was developed to measure changes from time to time in prices of goods and services purchased by wage earners; it was not developed to provide comparisons between places, although it has frequently been used incorrectly for this purpose. Since the Consumer Price Index endeavors to measure changes in the prices of articles typically purchased by wage earners in each city covered and since typical purchases vary from city to city, it is obvious that there is no necessary correlation between cities in this Index. For example, the Consumer Price Index measures the changes in the rent for homes in which wage earners live in Chicago, Dallas, New York and Los Angeles. Housing in these cities is not comparable and no effort has been made to compare them in the official Index. A higher index in any one of these cities than in another merely indicates a more rapid increase in prices from the base period in the one city than in the other. It does not mean that prices are higher. The official Consumer Price Index, therefore, should not be used for inter-city comparison of levels of cost of living. An index for measuring inter-city differences in consumer prices is one of the gaps in government prices statistics.

Limitations And Qualifications

In summation, it is well to note the limitations and qualifications of the Consumer Price Index. They are:

- The Index is not an exact measurement of price changes. It has certain errors in it that are unavoidable as a practical matter. Increased accuracy must be weighed against an increased cost. And since the Bureau of Labor Statistics is limited in its funds, some accuracy may be lost.
- There is no overall consumer price index covering all classes of consumers. (Families with incomes of less than $10,000 are the only ones who are used in survey work.)
- There are many classes of urban workers for which the C.P.I. is not a specific measure of change in the "cost of living" such as small businessmen, professional people, an aged couple living on a pension, or persons working for less than minimum hourly wages. In addition, there are various consumer groups living in small communities which are not represented, for example farmers.
- The Index does not measure differences in price levels between cities. A higher index in one city means that the prices have risen more since the base period.
- The Index is not a measure of changes in total living costs or living standards.
- Measurements of price changes over short periods of time tend to be more accurate than over long periods, which is typical of any index.

There's One At Every Union Meeting

1. The Confused Listener

He tries to be helpful but can't follow the proceedings. He rises to say there's a motion before the house; and has to be told it was rejected half an hour ago. He has a habit of sitting in the last row and of complaining he can't hear. Throughout he carries an outraged attitude of "why don't people tell me these things."

2. The Professional Seconder

He never thinks up an idea, and is so overwhelmed when someone else does, that he comes in with a loud "second the motion." Any nonsensical scheme any one can think up gets his nod. He then settles back to enjoy the confusion, or dozes until time for him to chime in with another second.

3. The Willing Voter

He takes little part in business but votes in loud voice. He is always eager to swell the vote of the prevailing side. A dangerous yes man.

4. The Behind-the-Hand Mutterer

He fumes, fidgets, mutters to his neighbor, but seldom takes the floor to speak. If you sit beside him you will miss hearing the most important points of the meeting. He votes no consistently, and mutters, "What can you do in a mess like this—it's a gang of dopes."

5. The Explode-at-the-Door Man

He sits quietly through the meeting as if everything were to his liking, but at the door he boils over. You hear him say, as he rounds up a few discontented members, "And another thing I didn't like . . ."

6. The Next-Day Complainer

After thinking it over, he decides the meeting had better be run over. As he corners you, he says, "Are you going to stand for that?"

7. The "We-Always-Do-It-This-Way" Member

He is a traditional, forever looking over his shoulder. The old way is the only way. If a change of any kind is suggested, or a new idea brought forth, he fears the new officers are leading up to ruin.

8. The Super-Parliamentarian

He knows all the rules when they are not needed. But when you run into difficulty, and call upon him for advice, he has forgotten his rule book.

9. The Stay-at-Home Member

Meetings bore him. He has his own way of wasting time. Besides he doesn't want to feel responsible for anything that happens. The blood is not on his hands if he didn't go to the meeting.

10. The Obstructionist

He delights in tying the meeting into knots. Anything that he can do to make the meeting so long or unpleasant that members will stay away next time, he will gladly do. He may work with henchmen to wear down the membership so that his gang can take over.

11. The Pre-Meeting Specialist

Before the meeting is held, he explains just what should be done. He is still going strong at 1:30, but by meeting time he is exhausted and has to be guided home.

If Your Line Has Sporting Blood . . .

"Have Blue Serge Suit—Will Fly." We Can't Vouch For The Truth Of This, But We Are Reasonably Certain He Did Not Get The Job

Dear Capt. Thompson:

I am answering your ad in *Aviation Weekly* for a pilot. I figure I am just the man for the job as I like to fly a lot. Among other publications, I subscribe to *Aviation Weekly* (where I saw your ad, by the way), which proves that I am interested in airplanes, as that is very dull reading unless you like airplanes a lot, which I do.

My experience is pretty well rounded off in this flying game. I do not have an instrument ticket yet, but I figure we won't want to be doing too much flying on the gauges in your airplanes. But, anyway in a pinch, I figure I can get it down through the soup by keeping the compass card level, so I don't anticipate any trouble there.

His Log Time

My total time so far is 72 hours, 71 of which has been in J-3 Cubs. The other hour was in a 1932 Kinner Bird which has open cockpits. If any of your executives have sporting blood, I think maybe we should have a Kinner Bird in addition to the company planes, as it really is a dandy. This particular one I flew was licensed for four people and by golly, it performed good. Incidentally, drop me a card by return mail if you think you will be interested in the Bird. I think it can be had for about 600 bucks as the guy who owns it cannot afford to get the thing fixed up and flying. He is trying to get me to pay for the damage, but I am still paying for the Cub I taxied into, so I guess he won't get much out of me. The operator was pretty mad about the Cub but I told him that the airplane shouldn't have been tied down there anyway on such a nice day. I do think the Bird should be modified to a tricycle type landing gear, however, as it is difficult to see over the nose while taxiing unless you stand up in the seat.

Other than that incident, I have had all accident-free hours, unless you count the time that I busted up a Cub when I came back from my 100 mile cross-country flight, but that was no fault of mine. When I arrived at the field, there was a pretty strong cross-wind and this wind sort of blew me sideways into a runway marker when I landed. I think I would have been able to keep on the runway except that my left foot was asleep from having to hold the airplane in a crab all the way home. I took my business elsewhere after that because that airport had only 300' wide runways and that just isn't enough in a cross-wind.

Something Was Wrong

I might say here that I have considerably more cross-country experience than the average 72-hour man. I have, of course, made the 100 mile cross-country as required, but my 100 miles developed into about 300 miles by the time I got home. But there again, poor equipment shows up. The Cub I flew that day didn't have a compass deviation card, due to poor management at the field, and you know as well as I that you can't do good navigation without a compass deviation card. Also, the airplane kept turning into the wind all the time and that didn't help matters any. I assume your airplanes have a compass deviation card as I make it a point not to fly cross-country without same. Oh, I can see where you might want to make a short trip of 15 miles or so, but on long cross-country hops, no sir, not without a deviation card!!!

Please advise me if you will require me to wear a uniform. It doesn't make any difference to me, one way or the other, but it does add a classy touch if the pilot has on something snappy looking. For a uniform, what I mean is, say something conservative like a dark blue. In fact, I have an old blue serge suit I don't wear much, and we could get some gold stripes or something and sew on the sleeves. I won't charge you nothing for the suit as it is already paid for, and anyway, I don't wear it much. Do you think it would be better to take off the belt in the back, or leave it on?

Maybe in the summertime we could jazz up a little and have a white uniform, but that is strictly up to you.

What's Needed

I have enclosed a booklet entitled questions and answers for the private pilot so as to give you an idea as to what we must know as pilots. As you can see, just any old body cannot make the grade in regards to these requirements. Really, now you have got to know these things good in order to qualify. There is no doubt, tho, that anybody can get fouled up a little, like the time I made a night landing at a big airport, and the tetrahedron was

flashing, so right away I know they have a right hand pattern, but they chewed me out pretty good when I got down because what I didn't know was that the flashing thing I saw was a sign pointing to a drive-in movie across the street from the airport. I found out later that a flashing tetrahedron doesn't mean a right hand pattern anyway, so those guys hollered at me for nothing. That happened on my 100 mile (or 300 mile you might say) cross-country, by the way. I forgot to tell you I stayed overnight on that trip. Actually, I have 73 hours, but I never counted that one hour night time because the ship wasn't licensed for night.

Maybe you would like me to come to Washington for a personal interview with you. I guess my best bet would be to fly up to National Airport and then take a cab downtown. Since you live in Washington, you probably know what time the fellows get to those airports in the morning, so would you drop me a line and let me know. I like to get an early start when I'm going flying, but I don't want to get there before the operator as I will probably want to get gas and check on the weather for my trip back home.

Also, let me know what the cab fare will be as I don't want to be caught short of ready cash.

Ready And Willing

I will be ready to start work (if you call flying *work*—frankly, I think it is a snap) at any time you decide. At present I am unhampered by any previous commitments. I must admit, however, that I have an ad in the same issue of *Aviation Weekly* that your ad is in, only my ad is under Positions Wanted. Of course I don't want to rush you but I am going to take the first job offered that meets my requirements, so I cannot promise you just how much longer I will be available. In fact, my flying instructor has been telling me that he doesn't expect me to be around very much longer.

I have purposely avoided my mention of salary as I think we can come to some gentlemanly agreement on that.

Expecting to hear from you soon, I remain

Very truly yours,
"Ace" Anonymous

P.S. Let me know if you are interested in the "Bird", and let me know about the blue serge suit.

(*From Allegheny Airlines'* Air Commuter)

FLYER'S FORUM

More About The Mountain Wave

An Air Line Pilot Reports Some Interesting Facts On This Phenomena

By Roger E. Ruch
AA

On March 8, 1957, I was basking in the sunshine at Bishop, California, waiting for a lenticular to form. Calling John Aldrich of the Los Angeles Weather Bureau in disgust, I asked, "Where is the Sierra Wave you forecast?" After a few minutes looking at his charts, he reported, "It's got to be there; you just can't see it." Taking an immediate tow to 13,000′ I cut loose from the airplane, which by now was almost dead weight, and soared to over 30,000′. It is now apparent that a Wave is a simple question of which way the wind is blowing.

In this respect we are fortunate. The accurate upper air analysis by the air line is unexcelled and has amazed even veteran Wave sailplane pilots.

A Misconception

The most popular misconception about Mountain Waves is that such and such a cloud formation will be, and then impressive photos are shown to illustrate the foehn wall cloud, roll cloud, or Wave cloud. Waves are much more frequent where one, two, or all three of these are missing.

Near Bishop on May 2, 1957, we had several flights in gliders above 35,000′ and there wasn't a single cloud of any type in the sky the whole day. In addition the wind was so weak we were overruning the lift area while shuddering on the stall. Another misconception is that a Mountain Wave is a winter-time phenomenon. I have gone soaring in them all summer long. However it is undoubtedly quite true that the best (or worst, depending on your point of view) Waves occur with these distinctive cloud formations.

The sole purpose of the Mountain Wave Project and the only reason money was made available for the project was to investigate and publicize the altimeter error associated with the low pressure caused by the venturi effect of high wind over an obstruction. This effect has been grossly minimized.

Bob Symons has a winter contract with the Los Angeles Department of Water and Power to measure the depth and density of the snow in the eastern watershed of the Sierras. Near the tops of these mountains after landing on skis at points of known elevation, the altimeter has read as much as 2,500′ high if a strong Wave is in progress. Only about half of this can be accounted for by temperature.

An Accident Factor

The greatest single factor in alleviating this problem have been our pressurized aircraft which enable us to fly above the minimum enroute. How the CAB, in the Medicine Bow accident report, could completely write off the possibility of a Mountain Wave, and in practically the same breath describe conditions that we as glider pilots would look for as ideal soaring, remains a mystery to me.

All pilots flying in mountainous terrain have experienced Mountain Waves. Say, you are proceeding upwind. While maintaining assigned altitude in smooth air you loose forty knots in less than a minute followed by a bump and shortly thereafter the lost airspeed is regained just as fast, again in smooth air; you've gone through a mild Standing Wave or one of its Lee Waves.

In a Wave is the smoothest air known to man, and yet just below it has occurred turbulence on the order of almost twice the highest ever recorded in a thunderstorm. It is a type turbulence all its own and can flip you over with no sensation of your ever having been rolled at all. Due to the time and finances involved, I have been unable as yet to explore as fully as I would like, Wave situations with a sailplane in all parts of the country. With a glider or light airplane I have flown Waves from the Pacific to Texas, and have observed the distinctive cloud formation in northern New York.

I have been curious about the theory that a Wave could form where wind flows over another air mass. This is evidenced by frequent tall cumulus having a lenticular for a cap, all blended in together. However not even this happens from slightly east of Denver to the Appalachians.

Waves can occur at any time and anywhere in the mountains. All that is necessary is that wind be hitting an obstruction.

Kuhn's Comments . . .

(Continued from Page 6)

It is enough to make piloting unattractive. Bales of manuals completely smother the candidate, when all he wants to know is where the throttles are and what it glides at. For the aging pilot that is not hard to remember. Having just recently spent over a week in ground school, and six days getting five-and-a-half hours transition on our new "Jetstream," I learned that it was "a little bit faster and a whole lot smoother." The only difference in the cockpit is the parking brake handle. Still and all, *it beats working*.

And now the Jets. What added gymnastics are required to guide one of them? Will the aging pilot be retired or retained? The answer is simply, *try him*!

The good Doctor says to accept aging graciously and gratefully. I can't go that far. I will say though, that if you live long enough, you are a cinch to grow old. Nobody has beat it yet.

PORTSMOUTH 7-1400

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TO ALL MEMBERS OF THE AIR LINE PILOTS ASSOCIATION, INTL.

Dear Member:

As you know, the thousands of United Funds and Community Chests across the nation will again this fall call upon all segments of community life to serve both as volunteer workers and contributors in fund-raising campaigns.

These once-a-year community-wide campaigns enable all groups in the community to support and plan local and national services in an economical and democratic way. These 1957 campaigns have recently received the official endorsement of the AFL-CIO through President George Meany.

I would like to take this opportunity to add my personal endorsement to this federated form of fund raising which enables us to give the "United Way" in support of voluntary and vital community services.

I am confident that all air line pilots will cooperate in this year's campaign as they have in those of the past.

Sincerely yours,

AIR LINE PILOTS ASSOCIATION

Clarence N. Sayen

Clarence N. Sayen, President

CNS/ng

"Schedule with Safety"

Blaming The Pilot . . .

(Continued from Page 4)

reached when the captain had retracted the gear and given the order for a reduction in power. All checks had been made and had shown that everything was functioning efficiently. The pilot then noticed that, in spite of the settings for steady climb, the aircraft was beginning to lose height. A rapid re-check showed nothing wrong and the pilot said that it was with "horror" that he noticed this sudden change.

He called for full power and was given it at once, although the propellers were not adjusted to enable full revolutions to be obtained. With full power the aircraft still lost height. The first officer looked out and saw that it was near the ground, flying with the fuselage apparently about level. The captain looked out to see the top of a tree ahead and the airplane so near the ground that a sharp turn would have put one wing tip into the ground. He took the most drastic evasive action

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possible, but a wing tip struck the tree and the aircraft was brought to the ground where it immediately caught fire.

As the aircraft touched, it broke, and it was partly this that enabled a few people to survive the accident. The usual procedure of investigation was followed. In addition witnesses were obtained who were able to speak of the weather at and around the point of impact at the time. The picture that eventually emerged was of a storm cell with the most violent wind fluctuation, and this produced gusts and a wind gradient which were in fact the "cause" of the accident.

Age-Old Controversy

This accident is particularly interesting because of the light it sheds on the age-old controversy about the effects of the wind upon an aircraft. Theoretically, as we are repeatedly reminded, when an aircraft is in the air it is of the air and consequently it should be unaffected so far as its flying speed is concerned by wind changes. In practice, as most pilots know, an aircraft in the air can be affected by wind movements. That is why the downwind turn used to be a dangerous maneuver with aircraft having small margins of speed like the early machines. I do not

regard myself as competent to offer explanations for these things. Some say that the inertia of the aircraft has something to do with it, and certainly the wind gradient has something to do with it. At any rate in the accident of which I am speaking it was the considered view of the court, after a painstaking inquiry, that the aircraft had been brought down by a sudden wind change which caused the aircraft to be flying into wind at one instant and to be flying down wind the next and which was accompanied by a down gust.

Note here that, had the pilot not lived, there would have been many people other than the members of the court of inquiry who might have been skeptical of a weather explanation. Note also that the "into wind" and "down wind" controversy has been going on since the beginning of aviation. It was only because the evidence was so complete and so telling that it was possible to state positively what caused that accident. The temptation to put the blame on the pilot, had the whole story not been discoverable, would have been strong.

Scapegoat?

During the course of the years I have seen many accidents and I have collected data on many others. When I was the air correspondent to the old *Morning Post*, I was sometimes dispatched to places where aircraft had crashed, but that was rather to report "all the horrible details", than to obtain exact and interesting technical information. Nevertheless it was borne in upon me that the pilot was being made the scapegoat too often.

In the accidents branch at the Air Ministry we have had many highly competent and impartial officials who have always tried to state the truth without fear or favor. But the "pilot error" judgment is, one might almost say, traditional. I believe we should, in the future, be more careful before we accept it. Perhaps it is sometimes given partly because we do not like to see any accident unexplained. It seems to be a reflection upon aviation itself when an aircraft crashes and no cause can be found. Yet it would be fairer to the pilots if it were to be admitted that sometimes the evidence is not sufficient to enable any cause to be stated with absolute certainty.

Finally, I would like to urge that the greatest frankness be adopted in the treatment of air accidents. There is good reason in the criticisms sometimes directed against the daily newspapers for the lurid manner in which they treat air accidents. But they treat other kinds of accidents in the same way, so presumably it is the way the great reading public likes. And to go to the other extreme is equally undesirable. I have never managed to look upon an air accident as something that ought not to be written about or discussed. There is nothing shameful about an air accident, whether the fault be with the designer, the manufacturer, the service engineer, the controllers, the pilot or anyone else. All these people try their best to prevent accidents, and even if one of them is eventually "blamed", it is not the kind of blame which implies any dereliction of duty. No human being can always avoid making

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mistakes, and an air accident is sometimes simply the expression of a mistake. So let us not react to the horror treatment of air accidents by trying to hush them up. They are often of the most absorbing technical and human interest; they deserve the fullest and the freest discussion.

New Outlook, Please

My plea, then, is not that we should treat air accidents as they were acts of God, nor yet as if they were matters unfit for open discussion, but that we should look upon them as sources of new information. And above all I would ask that, before we conclude that the pilot has made an error, we should be careful to examine all the possibilities with equal attention and equal openmindedness.

(From The MATS Flyer *and* Hawker Siddeley Review)

Flight Crew Stations . . .

(Continued from Page 11)

Since you, as crew members, carry the moral responsibility for the welfare of your passengers, serious design consideration must be given to designing all crew stations for maximum—practicable—crash protection.

Conclusions

To sum up:

- The human body can be severely or fatally injured in low velocity, low g accidents, if it strikes, or is struck by, rigid, sharp objects.
- Protection from such injuries can be provided by crash-safety design.
- This crash-safety design includes the delethalization of the crew member stations and the provision of adequate restraint for the human body in those areas which do not lend themselves well to delethalization.
- The strength of the restraint devices, including shoulder harness, safety belts, seats, seat anchorages and the floor structure should be equal to the overall strength of the fuselage structure in relation to its resistance to collapse in survivable accident conditions.
- The degree of crash protection given to cabin attendant station should be equal to that given other crew member stations since all crew members have an equal responsibility to the passengers in a crash emergency.
- Once the crash-safety design requirements for a particular aircraft is agreed upon by all concerned, a periodic evaluation should be made of the crew member stations during development of the prototype to make sure that a hazardous environment does not develop unknowingly.
- Since most severe but survivable airline crashes occur during take-offs and landings—and without warning—it is imperative that all crew members routinely use any protective devices—such as shoulder harness—that are provided.
- By adhering to these concepts, our crash safety and that of our passengers will reach an all-time high.

NACA—Cradle Of Aviation Research *by John F. Victory in the September* Air Line Pilot *originally appeared in* Flying *Magazine.*

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